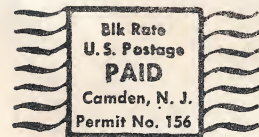**The Library
of Computer
& Information Sciences**

Front and Brown Streets
Riverside, New Jersey 08075
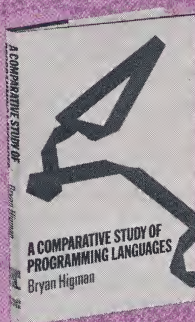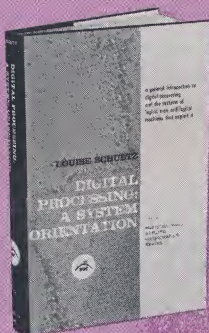
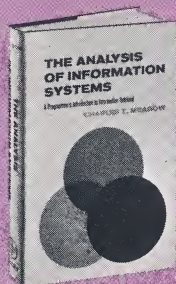*Address Correction Requested*

IMPORTANT:
**DATED
MATERIALS
ENCLOSED**

RECENT
SELECTIONS
of
The Library of Computer and Information Sciences
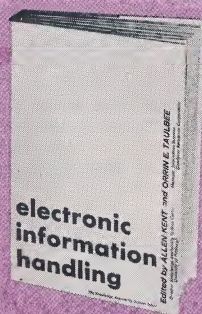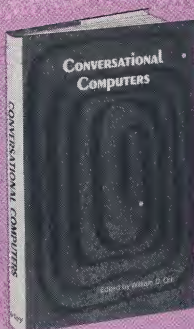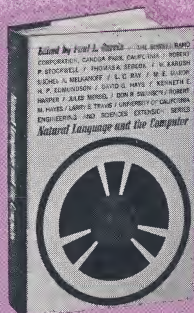
Any of the Selections described in this brochure may be ordered by members of The Library of Computer and Information Sciences, in addition to or instead of the current Selections. All are available at reduced Member's Prices. One Bonus Book Credit is given for each Selection purchased. **To order, please indicate the code numbers of the books you have chosen on the enclosed Order Card.**

*Digital Processing: A System Orientation (42270)
By Louise Schultz
A highly readable survey of the principles, techniques, and applications of digital processing in linguistic, rather than symbolic, terms. Emphasizes fundamental concepts and functions of both devices and programs. *Retail price $14.35*
Member's price $8.95

A Comparative Study of Programming Languages (39780)
By Bryan Higman
An authoritative discussion of the features of each of the programming languages available together with an incisive analysis of their structure and function. Indispensable for readers who want more than a mere working knowledge of programming languages. *Retail price $8.50*
Member's price $6.75

Probability Theory and Its Applications Volume 1, Third Edition (70350)
By William Feller
This newly revised edition of the recognized classic develops probability theory as a mathematical discipline and, at the same time, illustrates a broad variety of practical problems and the modern techniques for solving them. A self-contained introductory course. *Retail price $10.95*
Member's price $7.95

Conversational Computers (40410)
Edited by William D. Orr
A comprehensive review of the latest developments in time-sharing interactive computer systems and on-line problem solving. Contains important contributions by J. C. R. Licklider, John McCarthy, Vannevar Bush, and many others.
Retail price $8.95
Member's price $6.95

*Developing Computer-Based Information Systems (42060)
By Perry E. Rosove
A comprehensive study of the new information technology. Examines development of systems—including requirements, design, production, installation and operation—and emphasizes the typical management problems likely to be encountered in their implementation. An intensely practical book.
Retail price $14.95
Member's price $10.95

The Analysis of Information Systems (33400)
By Charles T. Meadow
Here is a careful study of the languages of information retrieval, the organization of records and files, and the machine processing of stored information. Supplies the background needed for participation in the analysis and design of information-handling systems and for understanding the literature in the field.
Retail price $11.95
Member's price $8.25

*Display Systems Engineering (42370)
Edited by H. R. Luxenberg and R. L. Kuehn
A thorough exploration of the devices and systems of recording and displaying computer-based information. Develops theoretical foundations of all display systems and discusses their technological applications. Includes many illustrations and diagrams. *Retail price $16.50*
Member's price $11.95

Introduction to Computing (56300)
By T. E. Hull
Thoroughly explains the principles and applications of computing. A highly useful new guide to algorithms, stored-program computers, and programming techniques, it focuses on Fortran IV—one of the most widely used algorithmic languages in computing. *Retail price $10.60*
Member's price $7.75

Introduction to Computational Linguistics (56490)
By David G. Hays
A comprehensive work covering computer applications to linguistics. Includes discussions of storage and control, text processing, transformational parsing—and applications of these processes to linguistic research, publication systems, information dissemination and retrieval, and translation. *Retail price $9.75*
Member's price $7.50

*Electronic Information Handling (44100)
Edited by Allen Kent and Orrin E. Taulbee
A complete overview of the rapidly expanding field of information handling and retrieval. Among the topics covered: interpreting signals and numerical information, future hardware for electronic information-handling systems.
Retail price $11.00
Member's price $7.95

The Impact of Computers on Management (55140)
Edited by Charles A. Myers
Presents the latest thinking and research on the relationship between man and machine and the roles of both in industrial organization, stressing the implications of computers for managerial work. Based on a conference of experts at the Alfred P. Sloan School of Management of Massachusetts Institute of Technology.
Retail price $10.00
Member's price $7.50

Natural Language and the Computer (63840)
Edited by Paul L. Garvin
The first book to provide a comprehensive survey of the emerging field of language data processing (by "language" is meant a natural language such as English or Russian, and not an artificial language such as ALGOL, FORTRAN, or MAD. It not only covers all aspects of the computer processing of natural-language data, but also gives extensive background material in linguistics, mathematics and computation.
Retail price $13.75
Member's price $9.25

Programming Systems and Languages (70790)
Edited by Saul Rosen
A comprehensive, detailed review of computer software that brings together the most authoritative articles from computer journals and proceedings. Covers the entire history of programming systems and languages. So up-to-date that it treats areas still being developed and tested.
Retail price $12.50
Member's price $8.95

Introduction to Dynamic Programming (56470)
By George L. Nemhauser
A volume of unique value to those concerned with optimization problems. Analyzes in order elementary and complex systems; emphasizes when to use dynamic programming and how to do the computations; provides numerous flow charts and exercises. *Retail price $7.95*
Member's price $6.50

Digital Computer Programming (42190)
By Peter A. Stark
Uniquely practical introduction to the programmer's art, with step-by-step solutions to hundreds of typical computer problems. Covers computer characteristics, applications, techniques, and languages.
Retail price $9.95
Member's price $7.50

*Electronic Digital Systems (44070)
By R. K. Richards
A pioneering exposition of the fundamentals, concepts, and ideas pertinent to a wide range of digital systems. Arranged so that the reader is provided with ready access to every important scheme devised to meet the requirements of digital systems, including the most thorough presentation of the stored-program concept yet published. *Retail price $15.95*
Member's price $10.95

Integrated Data Processing Systems (55660)
By E. Jerome McCarthy and J. A. McCarthy. Edited by Durward Humes
A comprehensive, jargon-free book "aimed at those who want to understand *in depth* how data processing machines can help analyze business information. It is well organized, highly readable." — *Elias M. Awad, De Paul University*
Retail price $8.95
Member's price $6.95

Elements of Data Processing Mathematics (41660)
By W. T. Price and M. Miller
Concise, comprehensive exposition of the science of mathematics as it is applied in computer programming and data processing. Includes matrices, linear programming, series and iterative methods. Hundreds of challenging exercises. An ideal volume for self-instruction.
Retail price $10.50
Member's price $7.75

Titles marked with an asterisk (*) are not available as free books.

Enroll new members in The Library of Computer and Information Sciences and receive FREE copies of books from this list of Recent Selections

Do you have friends or colleagues who would enjoy the many benefits of membership in The Library of Computer and Information Sciences? Why not tell them about the wide range of selections, books on systems design, operations research, information retrieval, programming, and many other topics, all available at reduced Member's prices—plus free Bonus Books. For every member you enroll, we will send you one free book from this list of Recent Selections. Of course, you may enroll as many members as you wish, simply by filling in the spaces below. To receive your free books, return this form, with the new members' signatures, to The Library of Computer and Information Sciences, Front and Brown Streets, Riverside, New Jersey 08075.

Please enroll the new member(s) listed below. Send to each, as a free Membership Gift, the volume listed—any book described in this list of Recent Selections.* Also send the first Membership Selection indicated—any of the current Selections or any of the volumes in this list of Recent Selections. SEND ME MY FREE BOOKS AS SHOWN—ONE FOR EACH NEW MEMBER I HAVE ENROLLED.

*Except those designated "Not available as free books."

New Member _____

Address _____

City _____

State _____ Zip _____

Free Book _____

_____

First Selection _____

_____

New Member's
signature _____

New Member _____

Address _____

City _____

State _____ Zip _____

Free Book _____

_____

First Selection _____

_____

New Member's
signature _____

New Member _____

Address _____

City _____

State _____ Zip _____

Free Book _____

_____

First Selection _____

_____

New Member's
signature _____

My Name _____

Account Number _____

Address _____

City _____

State _____

Send as my Free Book(s) _____

(1) _____

(2) _____

(3) _____

The Library of Computer and Information Sciences

JANUARY

Introduction to Operations Research

by Frederick S. Hillier and Gerald J. Lieberman

In the short space of three decades, the science of operations research has grown tremendously. This expansion has taken place not only in the sophistication of the techniques used, not only in the numbers of personnel employed, but also in the types of problems operations research can solve. So rapid has been its growth that many workers in the computer and information sciences are completely unaware of the capabilities of this emerging new science.

Operations research was born out of the exigencies, shortages and deficiencies of war. During World War II, the first operational research studies were carried out in the use of artillery-control equipment; without the contributions of operations research scientists from many disciplines who showed the military how to improve the capabilities of their newly invented radar early-warning network, the Battle of Britain could not have been won.

At the conclusion of the war, many operational research workers moved into civilian activities in government and industry, carrying with them the message of the revolutionary new techniques of operations research. Management quickly recognized that *past experience was no longer wholly adequate* in solving complex problems and—in a new industrial "revolution"—operations research and the electronic computer offered an incomparable team for problem solving.

This new science of operations research uses familiar ingredients in a completely new mix. These are:

☆ a systems orientation
☆ the use of an interdisciplinary approach
☆ the scientific method
☆ the concept of the model

This month's Main Selection, INTRODUCTION TO OPERATIONS RESEARCH offers a comprehensive survey of the basic methodology and techniques of the new science of operations research, with emphasis on motivation and simplicity of explanation rather than on rigorous proofs and technical

"This is a very useful addition to the literature; it can be recommended as a lucid and careful general introduction to operational research."
—*Operational Research Quarterly*

"INTRODUCTION TO OPERATIONS RESEARCH is written in a lucid and lively style. The operational research techniques are clearly and systematically presented, care being taken to avoid gaps in the argument which might puzzle the beginner. Realistic examples are frequently used to illustrate the problems considered, and to demonstrate how they can be solved by the newly acquired techniques. The authors make special effort to stress the assumptions which underpin the methods, and often discuss situations where these assumptions are not fulfilled. They also pay special attention to practical problems which may arise when applying the techniques, and give advice on how these may be overcome. In these two respects the book is much better than some of its competitors."
—*Journal of the Royal Statistical Society*

"INTRODUCTION TO OPERATIONS RESEARCH is likely to become one of the more widely used texts for operations research courses at the undergraduate and first graduate levels. It offers an exceptionally clear and up-to-date exposition of most of the models which are usually included in such courses, and a welcome change from the standard texts written eight to ten years ago."
—*Technometrics*

details. Divided into five completely integrated parts, because of its clarity and flexibility it is ideally suited for self-tuition. Part One of this big, 639-page book provides a general introduction to the *methodology* of operations research and outlines the planning that goes into an operational research study:

☆ formulating the problem
☆ constructing a mathematical model
☆ deriving a solution from the model
☆ testing the model and the derived solution
☆ establishing controls over the solution
☆ putting the solution to work: implementation

The second part of INTRODUCTION TO OPERATIONS RESEARCH deals with *fundamentals* — those aspects of probability theory, statistics and mathematics that are most relevant to operations research. Throughout, the reader of this new volume can concentrate on the basic models and analytical techniques of operations research.

Part Three gives a complete elementary introduction to mathematical programming (those desiring more advanced material will find it in the final section). The fourth part deals with the probabilistic models of operations research.

Among the techniques discussed in depth are:

- linear programming—an ideal technique for handling inventory and allocation problems

- PERT (Program Evaluation and Review Technique)—invaluable for handling sequencing problems and for measuring and controlling any program or project involved in meeting deadlines

- dynamic programming — best suited for solving problems involving deteriorating equipment (how to determine *when* to replace an item)

- game theory—the technique for handling *competitive* situations with applications to everything from business to politics

Among the methods presented for analyzing problems and synthesizing solutions are those for:

- queueing theory—the study of waiting times that occur whenever the demand for a service exceeds capacity

- inventory theory—the problem of what to do with idle resources —men, machines or money

- Markov chains—a stochastic process which has the property that any future "event" is independent of any past "event"

- simulation—a way of experimenting in abstract form and an important tool of the designer

A comprehensive series of appendices and tables rounds out the usefulness of Hillier and Lieberman's INTRODUCTION TO OPERATIONS RESEARCH. The material is everywhere presented from a mathematical viewpoint, although at a relatively elementary level, and is well-suited for readers who have had only a basic course in calculus.

Operations research is a revolutionary new tool of wide application that is distinguished not by *what* it investigates but *how* it conducts its investigations—really nothing more than common sense in action. Whether your problem involves purchasing, production, marketing, research and development, data processing, sequencing, personnel, finance and accounting, operations, or overall planning, INTRODUCTION TO OPERATIONS RESEARCH will provide you with remarkable new insights for their solution.

About the Authors

Frederick S. Hillier is Associate Professor of Operations Research at Stanford University. He received his Bachelor's degree and his Ph.D. from Stanford University in 1958 and 1961, respectively. Appointed to the Stanford University faculty in 1961, he spent 1962-63 as a visiting professor at Cornell University. Dr. Hillier was the award winner in the 1963-64 research contest on *"Capital Budgeting of Interrelated Projects"* sponsored by The Institute of Management Sciences and the Office of Naval Research.

Gerald J. Lieberman is Professor of Statistics and Operations Research at Stanford University and Executive Head of the Department of Operations Research. He received a Bachelor's degree in Mechanical Engineering from Cooper Union in 1948, a Master's degree in Mathematical Statistics from Columbia University in 1949, and a Ph.D. degree in Statistics from Stanford University in 1953. Dr. Lieberman has worked for the National Bureau of Standards and is currently a consultant to several industrial organizations. He is the co-author of *Engineering Statistics, Handbook of Industrial Statistics, Tables of the Hypergeometric Probability Distribution,* and *Tables of the Non-Central t-Distribution.*

Contents

Preface

The Main Selection

Introduction to Operations Research

by Frederick S. Hillier and Gerald J. Lieberman
Retail Price $14.75

Member's Price $10.50

Plus one bonus credit toward the four required for your next free Bonus Book

Alternate Selection

Systems Engineering Tools
by Harold Chestnut

Systems engineering is an important new concept which emphasizes interrelationships rather than specialties. It attempts to meet the challenge of complexity in today's world by engineering not components but entire *systems*.

SYSTEMS ENGINEERING TOOLS is a comprehensive overview of this fascinating and challenging new field—a big (646 pages) and practical compendium of time-tested methods and procedures written by the manager of systems engineering and analysis at General Electric's Advanced Technology Laboratories. It begins by lucidly presenting the *concepts, definitions* and *tools* of systems engineering. Drawing on practical situations, the author shows how two completely different systems—an electric utility system and a re-entry space vehicle system—illustrate the fundamental requirements of the systems engineering approach.

Energy, materials and *information* are next treated as convenient and widely accepted systems features which contribute to the success of any system. *Modeling* and *simulation* are presented as examples of methods for evaluating actual system conditions, although—as the author points out—they seldom yield more worthwhile results than the data fed into them.

Systems engineering projects tend to be of such magnitude and scale that the use of computers is a requisite. However, existing computer methods tend to be analytical rather than adapted to synthesis. SYSTEMS ENGINEERING TOOLS stresses the function that computers can perform in the engineering of a system (*design*) as well as for the the successful performance of the system (*control* or *operation*).

SYSTEMS ENGINEERING TOOLS presents an excellent analysis of both *analog* and *digital* computer capabilities to answer the basic questions of how and when to use each type of computer in systems engineering applications. The principal advantages of the digital computer are its accuracy and its memory; the analog computer matches these with its speed and its ability to operate in parallel. For these reasons, the digital computer has been extensively used for solving mathematical processes in which numerical methods are the most effective approach, while the analog computer has been employed for solving those problems in which synthesis of the process by electric circuits is the best approach.

SYSTEMS ENGINEERING TOOLS next describes particular "tools" useful for solving systems engineering problems:

■ control—an important tool sometimes mistakenly considered to be the answer to the entire problem
■ probability and statistics — emphasizes the role of averages, chance and experimental error in systems

- signals and noise—presented from both an analog and digital point of view in a deterministic and a random, or stochastic, sense
- optimization—surveys the ways optimization can best be used to determine what systems parameter values will yield the best system
- tolerances, variations and disturbances—effects which are important to systems operation and often determine how a system will actually perform

SYSTEMS ENGINEERING TOOLS concludes with an illuminating exploration of engineering a projected nationwide information-handling system using computers and other systems engineering tools.

SYSTEMS ENGINEERING TOOLS will be an invaluable addition to the working library of everyone seeking to broaden their areas of understanding of and their own capabilities in systems engineering.

Contents

1. **Systems Engineering in Industry**
2. **Energy - Materials - Information**
3. **Modeling and Simulation**
4. **Computing**
5. **Control**
6. **Probability and Statistics**
7. **Signals and Noise**
8. **Optimizing**
9. **Tolerances, Variations, and Disturbances**
10. **Engineering an Information-Handling System**
Bibliography
Problems
Index

SYSTEMS
ENGINEERING
TOOLS

Alternate Selection

Systems Engineering Tools

by Harold Chestnut
Retail Price $14.95

Member's Price $10.50

Plus one bonus credit toward the four
required for your next free Bonus Book